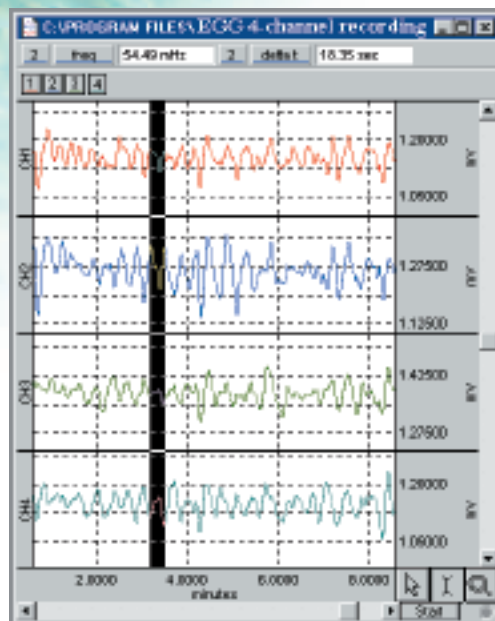


Measure the time-varying electrical activity of the gastrointestinal system of human and animal subjects, invasively or noninvasively. Gastrointestinal motility is directed by chemical, neural and myogenic control systems. The myogenic control system is manifested by slow wave cyclic depolarizations of smooth muscle cells called the electrical control activity (ECA). This myogenic system and the resulting electrical response activity (ERA) influence the contraction patterns in the stomach, small intestine and colon. The myogenic system affects the frequency, coordination, direction and velocity of the contractions. The combined ECA and ERA signals constitute the electrogastrogram (EGG) recorded by the EGG100C.

## FEATURES

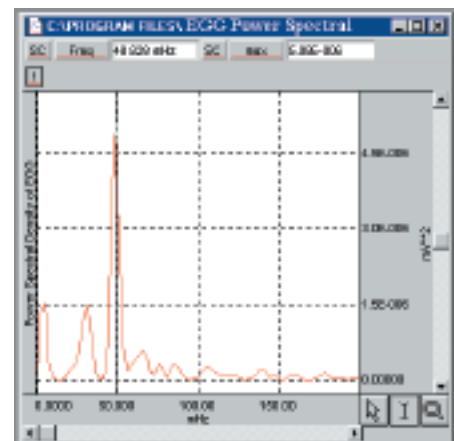
- INVASIVE/NONINVASIVE ELECTRODE MEASUREMENTS
- GASTRIC MYOELECTRIC ACTIVITY (SMOOTH MUSCLE)
- GASTRIC SLOW WAVE PROPAGATION
- GASTROINTESTINAL MOTILITY ANALYSIS
- PERISTALTIC (SLOW WAVE) PROPAGATION
- MIGRATING MYOELECTRIC COMPLEX
- ANIMAL STUDIES
- AUTOMATIC DATA REDUCTION



### INVASIVE/NONINVASIVE ELECTRODE MEASUREMENTS **Q29**

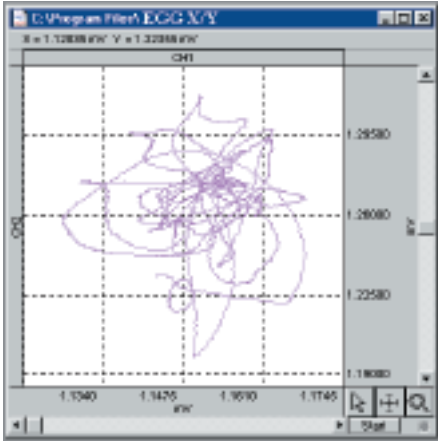
The EGG100C amplifier can be used to isolate elements of the gastrointestinal system for recording, through the use of either surface or needle electrodes. The EGG can

be recorded cutaneously with disposable or reusable surface electrodes. Alternatively, the EGG can be recorded using needle electrodes or custom electrode arrays for direct smooth-muscle measurements of the stomach, small intestine and colon. For measurements inside layers of smooth muscle tissue, use the EL450 Teflon®-coated needle electrodes. Up to 16 EGG100C amplifiers can be used simultaneously to record surface or subcutaneous signals. JUMP100C jumper connectors are used to reference amplifier inputs to satisfy any combination of monopolar or bipolar recording modes.



## GASTRIC MYOELECTRIC ACTIVITY

The normal stomach generates a myoelectric signal (EGG) that oscillates with a period of three cycles per minute. The EGG can be measured noninvasively by using the EGG100C amplifier and standard leads with disposable electrodes. After the data is recorded, the signal median frequency and power spectral density can be determined using *AcqKnowledge*. This type of signal processing is useful for evaluating abnormal gastric rhythms, such as tachygastric or bradygastric. It's also possible to evaluate the EGG signal using the phase-space techniques associated with non-linear dynamics. Plotting EGG rate against a delayed version of itself in X/Y mode can point to patterns not otherwise evident in the time series data.



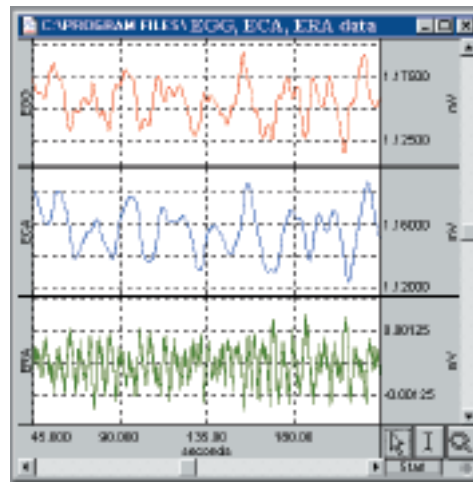
## GASTRIC SLOW WAVE PROPAGATION

The gastric slow wave (ECA) originates in the proximal stomach and propagates distally towards the pylorus. For recording, place multiple surface electrodes on the abdomen along the gastric axis and connect them to respective EGG100C amplifiers that have a common reference electrode placed near the xiphoid process. For consistent electrode-to-electrode spacing, use the EL500 dual electrodes with LEAD110 leads. For extremely tight electrode-to-electrode spacing, use the EL254 or EL258 reusable Ag-AgCl lead electrodes. The signals amplified at each electrode will be displayed on consecutive channels in *AcqKnowledge*. For manual measurements, use the cursors to evaluate waveform differences. For automated timing analysis, run the Peak time detector on one channel and search the remaining channels for their respective peak times. To verify the delta time consistency, automatically calculate the difference in peak times between the channels.

## GASTROINTESTINAL MOTILITY

### ANALYSIS Q30

The ECA and ERA components of the EGG can be isolated using the digital filters in *AcqKnowledge*. To isolate the ECA (slow wave) component, apply a 0.1 Hz lowpass filter to the EGG data. To filter out the ERA component, which consists of spike bursts present on the plateaus of the ECA signal, run a 0.5 Hz highpass filter. Perform filtering in real time as the EGG is recorded, or in post processing, after data has been collected.



## PERISTALTIC (SLOW WAVE) PROPAGATION

Peristaltic electrical signal propagation can be recorded using monopolar or bipolar recording techniques with the EGG100C and *AcqKnowledge*. To derive either long or short distance bipolar data, configure the amplifier to record with a common reference (monopolar) and then use the software to subtract one monopolar channel from another. After data collection, use the peak detection algorithms present in *AcqKnowledge* to analyze the time shifts between propagated signals on different channels.

## MIGRATING MYOELECTRIC COMPLEX

A histogram of the migrating myoelectric complex (MMC) can be extracted from bipolar EGG recordings. Use *AcqKnowledge* to perform peak-to-peak measurements on slow waves (ECA) automatically. The resultant cyclic peak data can be presented in histogram form to illustrate the presence or absence of spikes (ERA).

## ANIMAL STUDIES

The EGG100C amplifier, when used with standard needle or fine-wire electrodes, will record invasive EGG measurements on animals, directly on the tissue of the component organs of the gastrointestinal system. To record peristaltic propagation on the small intestine, create a custom electrode array using a soft-spring plastic clip with leads of silver wire looped at the desired recording sites and terminate the silver wire leads with a Touchproof socket for connection to the EGG100C. This type of electrode array has fixed and very repeatable electrode-to-electrode spacing.

## AUTOMATIC DATA REDUCTION

The powerful data reduction function will reduce large (24-hour) data files to manageable sizes. Select the appropriate measurements (Max, Min, Mean, Std Dev, Delta, Pk-Pk, Time of max, Time of min) and the summary time delta—the software will automatically analyze the data and enter the values into a Journal file and display them as new data channels. Analyze both primary signals (such as direct EGG) and derived data (such as the ECA component). The summarized data can be automatically displayed within *AcqKnowledge* for full access to all the analysis and measurement tools for further refined analysis.

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